# SOCIAL DISTANCING USING DEEP LEAENING MODELS AND YOLO FRAMEWORK

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**Abstract:** To mitigate the effects of the coronavirus outbreak, this work presents a deep learning-based method for detecting social distancing, which quantifies people's distance from one another. The detecting tool was developed to alert people to maintain a safe distance from one another by examining a video feed. For pedestrian detection, the camera's captured video frame was used as the input for an open-source object detection pre-trained model based on the YOLOv3 method. The distance from the 2D plane was then computed by creating a top-down perspective of the video frame. The distance between each person can be measured, and any pair that doesn't comply with the presentation will have a red frame and red line surrounding them. A pre-recorded tape was used to evaluate the recommended method. The recommended method was confirmed with pre-recorded video of pedestrians crossing the street. The result shows that the proposed method might be used to determine the social distancing between different people in the video. It is possible to enhance the described approach to make it a real-time detection tool.

**Index Term: -** Deep Learning,Yolo,CNN,Social Distancing , coronavirus

## I Introduction

In order to impose social distancing, group activities and congregations such as travel, meetings, gatherings, workshops, and prayer were forbidden during the quarantine time. People are encouraged to plan and carry out events primarily by phone and email in order to minimize in-person engagement. In order to further stop the virus from spreading, people are also recommended to take hygienic measures, such as often washing their hands, using masks, and avoiding close contact with sick people. However, knowing what can be done to stop the illness from spreading and actually doing it are two different things.

1. Deep learning has received more attention when it comes to object detection, which is employed for human detection.
2. Create a social distancing detecting technology that can gauge how far people are from one another in order to stay safe.
3. Analysis of the camera's real-time video feeds to assess the categorization findings.

This social distancing detection tool is intended to gauge the appropriate separation between people in public spaces. The deep CNN approach and computer vision techniques are applied in this work. The YOLOv3 technique was initially used by an open-source object identification network to identify the pedestrian in the video frame. Based on the detection result, this application only used the pedestrian class; other object kinds were ignored. Consequently, the best-fitting bounding box for each pedestrian spotted may be produced in the image, and this information will be used to calculate the distance. The camera is positioned at a fixed angle to record the video frame in order to provide a more accurate measurement of distance. Next, the video frame is transformed into a two-dimensional top-down image by processing it as a perspective view. It is assumed that the pedestrians in the video frame are moving in this way on the same level plane. To create a top-down view, four plane points are chosen from the movie frame. The location of each pedestrian can be estimated using the top-down perspective. One can measure and scale the distance between pedestrians. Depending on the current minimum distance, any distance that is less than the allowed distance between any two individuals will be indicated with red lines as a precautionary measure.

## . 2 Literature survey

### 2.1 MEASURING SOCIAL DISTANCING PRACTICES WITH GEO-LOCATED TWEETS

Although social distance is a valuable weapon in the fight against COVID-19, there are many different ways that the general public uses it. Social distancing policies in the US decreased the daily growth rate of COVID-19 instances, even though a state governor may issue an order for the practice. People in various states may react to this order in different ways. However, it is challenging to rule out potential confounders, such as extra policies for mask-wearing and increasing cleanliness as well as other social norms, if we simply take into account the duration of the social distance policy and the number of daily confirmed cases.

Thus, determining the real declines in travel and social interactions is essential to assessing the success of such initiatives. Using data from mobile phones, mobility patterns

were found to be substantially connected with lower rates of COVID-19 case growth in the 25 most impacted US counties. There's a chance that these social separation measures won't cease soon. As a result, people can start to loosen up their behavior, necessitating the need for new laws.

Researchers used movement data from the Boston metropolitan region to model the effectiveness of rigorous social isolation followed by testing and contact tracing. Furthermore, epidemiologists have previously created models to simulate how social distancing laws affect the progression of disease outbreaks. Adding real social distance measures into these models instead of presuming that official policies are followed in real life may make them more useful

**2.2** A VIDEO OBSERVATIONAL ANALYSIS

One essential non-pharmaceutical strategy to stop the COVID-19 coronavirus from spreading is social distance. The World Health Organization states that social distance is the best way to prevent pandemics. Past pandemics serve as an example, such as the 1918 Spanish flu pandemic, in which cities that practiced social distance had a decrease in the number of fatalities. Similarly, in the current COVID-19 epidemic, regional variations in the rates of transmission and mortality seem to be related to the degree to which social distancing is enforced.

The public's cooperation is necessary for social distance to be effective, yet human nature's need for close, face-to-face encounters may be a problem. Therefore, in order to decide whether to impose regulations in a voluntary or mandatory manner, policymakers require proof of social distancing compliance. However, little is now known regarding the degree to which people physically separate themselves from others in their daily lives—during pandemics in general as well as the current situation.

The study focuses in particular on how much people maintain a physical distance of 1.5 meters from strangers in public areas. Maintaining a physical distance from people is the social distancing strategy that is most closely linked to the spread of disease among all the other strategies (such as staying at home, avoiding crowds, and implementing preventive quarantines). After all, coming into close physical contact with a person who tests positive for COVID-19 exposes others to the virus. Other social distancing strategies, such avoiding unnecessary outside visits, only have an indirect impact on the risk of transmission because they lessen or eliminate the likelihood of people being physically close to one another.

**2.3** PROXIMITY-BASED INDOOR NAVIGATION SYSTEM TACKLING THE COVID-19 SOCIAL DISTANCING MEASURES

1)In this research, we describe an effective and affordable web-based interior navigation system that gives smartphone-equipped mobile users directions to their destination. Let's take the example of a hospital patient who has to report to a particular ward. He or she can inquire for directions to the location using a web application on their smartphone. The web application should, in our opinion, include the following features:

1. It should be able to detect the position of the user inside the buildings and track it during the time.
2. It should have knowledge of the environment.
3. It should be able to calculate the best path between the user and destination optimizing the metric of interest (e.g., the shortest path, the largest way and/or passage, the lowest people density level, and so on)
4. It should drive the user till the destination visualizing a map and providing vocal or iconographic instructions.

**3 Implementation Study**

Computer vision is a field of computer science that has made it possible for computers to perceive and understand objects in images and videos in the same way that humans do. The concept of computer vision may not seem very old, yet it dates back to the late 1960s when the first digital image scanner was created, turning pictures into numerical grids. You've probably heard of object detection and picture localization. When an object is the only one in the picture, we use the image localization technique to create a bounding box around it. In terms of object detection, it provides labels along with the bounding boxes, which enables us to predict each object's class and location. Image segmentation extends the idea of object detection by providing more detailed information about an image's shape. To help with more precise item differentiation, we segment the photos into sections with varying hues. The process of dividing up the image pixels into their appropriate classes is called semantic segmentation. For instance, all the pixels pertaining to the cat in the following graphic are colored yellow since the cat is connected to the color yellow. Since several objects belonging to the same class are regarded as a single entity, they are all represented by the same color.

**3.1proposed methodology**

**PROPOSED SYSTEM**

Detecting distances between pedestrians from monocular images without any extra information is not possible. One way (not very accurate though) is to ask the user for specific inputs leading to a distance estimation between the pedestrians. If the user could mark two points on the frame that are 6 feet apart, using extrapolation, one could find the distance between different points on the frame. This would have been true if the camera was equidistant to all the points on the plane where the pedestrians were walking. The closer the pedestrians are to the camera the bigger they are. The closer the two points (which are the same number of pixels apart) on the frame to the camera, the smaller is the actual distance between them.

To cope with this issue, the code receives 4 points input from the user to mark two lines that are parallel seen from the

above. The region marked by these 4 points are considered ROI (can be seen in yellow in the gif above). This polygon-shaped ROI is then warped into a rectangle which becomes the bird's eye view. This bird's eye view then has the property of points (which are the same number of pixels apart) being equidistant no matter where they are. All it needs is a multiplier that maps the distance between two points in pixels to distance in real life units (such as feet or meters). This is where the last two user input points come into play.

Deep Learning is used to detect and localize the pedestrians which are then mapped to a bird's eye view projection of the camera as explained above. Once we have the coordinates of the pedestrians in the bird's eye view the social distancing parameters become straightforward.

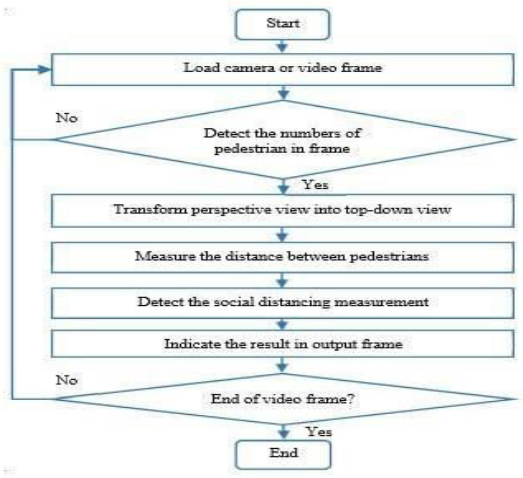


**Fig 1:- proposed social distancing model**

## 4 Results and Evolution Metrics

**Fig 2:- object detection and applying boundary boxes**


**Fig 3:-distance Analyzer using CNN**


**Fig 4: social distance Analser 3**

## 5 Conclusion

A deep learning model-based approach for detecting social separation is put forth. A red frame and red line will indicate any noncompliant pair of persons, and computer vision can be used to assess the distance between individuals. A video of people crossing a street was used to verify the suggested approach. The visualization findings demonstrated that the suggested method, which may be further expanded for usage in various environments like offices, restaurants, and schools, is capable of determining the social distancing measures between people. Additionally, the work may be made even better by enhancing the hardware's processing capacity, calibrating the pedestrian detection algorithm, incorporating other detection techniques as mask and human body temperature detection, and calibrating the camera perspective view Since this application is meant to be utilized in any type of workplace, precision and accuracy are essential to its functionality. An increased rate of false positives may cause individuals under observation to become uncomfortable and even panic. Additionally, legitimate concerns regarding privacy and individual rights may be voiced. These can be addressed with additional measures like obtaining prior consent for such working environments, generally concealing an individual's identity, and upholding transparency regarding its fair uses within small stakeholder groups.

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